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SELECTED PAPERS FROM
ICOM'01, ICOM'05 AND
ICOM'08

Editors

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A Maximum Power Point Tracking for Photovoltaic System Using Temperature Compensator Method

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ABSTRACT

An alternative control for maximum power point tracking (MPPT) method applied to the photovoltaic (PV) generation system is designed and is implemented. The proposed control method is designed based on analysis of the surface's temperature of solar cells. An optimal voltage of PV can be obtained from this analysis and was realized as a reference. By maintenance the output voltage of PV using the reference voltage control, the output PV can be optimized at its maximum power point (MPP) operation.

The MPPT performance of this method has been evaluated and discussed base on the results of experiment.

1. INTRODUCTION

Since the PV generating system is expensive to build it should be operated at the maximum output power levels. However, the output of a PV generating system is not systemically tracked and influenced by various factors such as solar insolation, solar cell's temperature and the connected load condition. Therefore, in designing the PV generating system the effect of these three factors should be considered. However, to overcome the adverse effects of the system and to operate the PV panel at maximum power point (MPP) every instant, a MPPT essentially is needed. To achieve this situation, several different schemes have been proposed and have been made public and some are still being released. The principle of tracking can be based on any of these such as the perturb and observed scheme, the feed forward control, the power comparison control, the array power ripple scheme, the energy storage capacitor and monitoring the pilot cell [1,2].

Some research group reported that the electric power generated by a PV panel fluctuates depending on the solar insolation and temperature [3-5]. The V-I characteristics of a PV panel are strongly nonlinear. It appears that fundamentally the only true power maximization may be obtained by a multiplication of instantaneous current and voltage, and a continuous maximization of this product by employing a controller.

The system designer aims to extract the maximum achievable electrical power output at all insolation levels to ensure efficiency of the system, especially considering the high cost associated with the PV panel and to overcome the mismatch between the PV panel and the load.

An important design consideration is the match between the I-V characteristics of the PV panel and the load, for this experiment the load is a SPE-Battery [6]. If the SPE-Battery is connected directly to the PV panel it impossible to operate on the MPP of PV panel due to the mismatch.

Figure 1 shows a simplified mismatch point between PV and SPE-Battery. The measured performance of PV at insolation 0.2 kW/m² and surface temperature of 30 °C, the SPE-Battery voltage remains almost constant during this experiment. When PV and SPE-Battery are connected